



STSM Scientific Report Template

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Visited scientist and host institution : Prof. Javier Trujillo Bueno, Instituto de Astrofísica de Canarias (IAC), La Laguna, Tenerife, Spain

Dates of STSM : June 1 – June 29, 2013

Explain briefly below how your STSM matched one of these key-points :

1. strengthen current collaborative projects

Dr. Jiří Štěpán has been collaborating with Prof. Javier Trujillo Bueno and his group on Solar Magnetism and Astrophysical Spectropolarimetry since his stay at IAC as a post-doctoral research fellow from 2008 and 2011. This collaboration continues to these days. We are studying the problems of non-LTE polarized radiative transfer, its numerical modeling, and applications of these models in the diagnostics of thermal and magnetic structure of the solar atmosphere.

2. establish new collaborations

We have initiated a new collaboration with Dr. David Orozco Suarez (IAC) and Dr. Stanislav Gunár (AIAS) in the field of magnetometry of solar prominences.

Describe below the activities carried out during the STSM and the main results obtained.

Within this STSM, *Three-dimensional Radiative Transfer Modeling of Polarization Signals in Chromospheric Lines*, we have carried out the first full 3D radiative transfer synthesis of the chromospheric Lyman-alpha line (to be observed by the NASA-approved CLASP sounding rocket experiment). This calculation has been done using our 3D radiative transfer code PORTA applied to the snapshot of the realistic MHD model of the solar atmosphere provided by the research group of the Oslo University. The numerical calculation has been carried out using the LaPalma supercomputer operated by IAC. During the STSM, we have started writing a research paper on the results of this investigation, which will be published in a major refereed journal.

In addition to the investigation of the Lyman-alpha line, we have been studying the polarized formation of the lines of the IR triplet of Ca II ion which are also of interest for diagnostics of chromospheric magnetic fields.

During this STSM, we have finished the manuscript of our paper on the numerical code PORTA which is now accepted for publication in *Astronomy & Astrophysics*.

A new collaboration has been established between the groups of IAC (Prof. J. Trujillo Bueno, Dr. D. Orozco Suarez) and AIAS (Dr. S. Gunár, Dr. J. Štěpán) in the field of multi-dimensional synthesis of polarized hydrogen lines of solar prominences and of the 10830 line of neutral helium. This modeling, supplemented by use of the existing inversion tools, shall lead to new progress in understanding of the fine structure of prominences and their magnetization.